

# Micro Surfacing on Concrete Highways



PAVEMENT PRESERVATION & RECYCLING SUMMIT

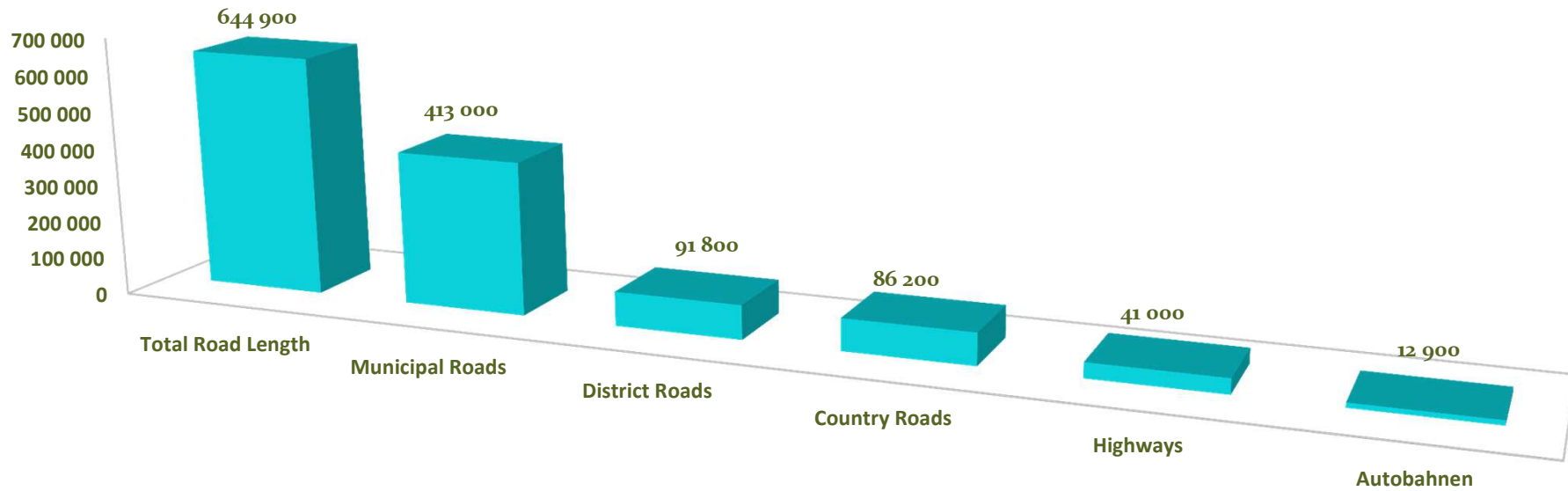
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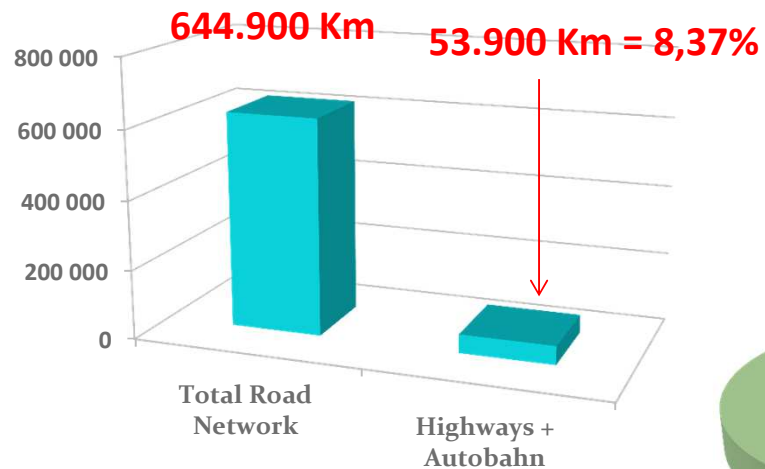


## Length (Km) of German Road Network 2013

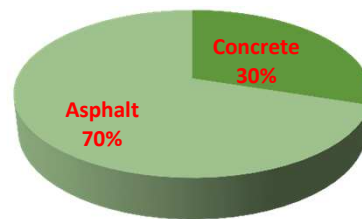




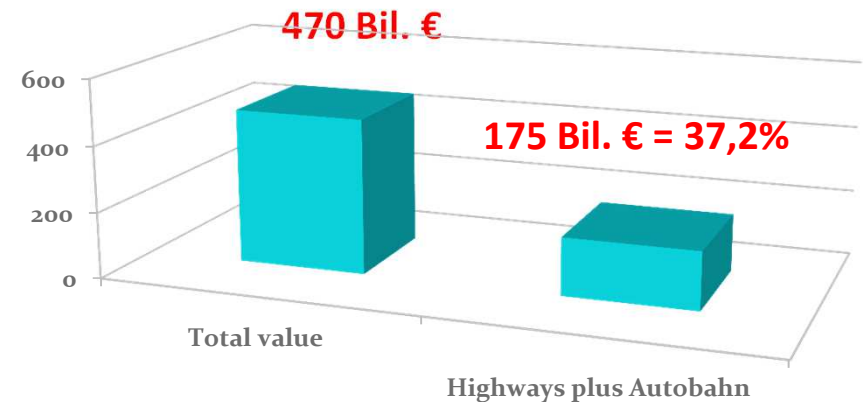
## Comparison: Total Road Network - Highways plus Autobahn



Length (Km) of Roads

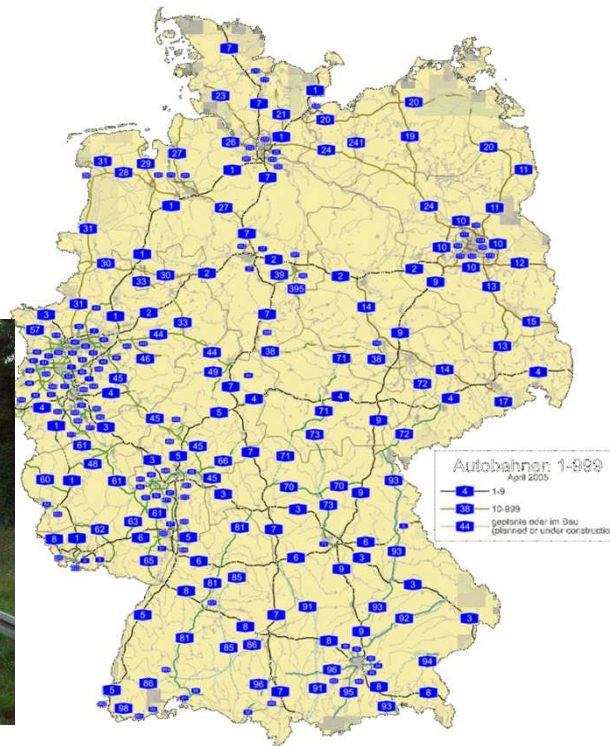


Highways + Autobahns



Value (Bil.€) of Roads

# Net of German Autobahns



## Micro Surfacing on any German Autobahn



**Micro Surfacing Maintenance of road sections „under traffic“**

Site location: right lane of the German Autobahn A5 from Basel in direction of Frankfurt between kilometer markers 601 - 591, close to Karlsruhe.  
Reason of maintenance: lack in surface texture and grip

## Traffic Load on Concrete Autobahn A5

A5 near Karlsruhe

Following a traffic censur 2014 there have been running:

143.394 vehicles /24 h	= + 2.9 % compared to 2013
20.229 goods traffic / 24 h	= + 1.6 %

Let's now talk about a Micro Surfacing treatment on the A5 Concrete Autobahn between Karlsruhe and Frankfurt - kilometer markers 601 > 591 - close to Karlsruhe.

Reason of this maintenance: lack in surface texture and grip, uneveness



## Preconditions for Micro Surfacing

**Production and Application of Micro Surfacing require a high quality level of its ingredients – such as aggregate and emulsion - as well as of the equipment and its crew!**

**To get public orders in Germany the contractors need following certificates to which I will refer later:**

- **Approval of Company's quality management**
- **Approval for proper micro surfacing mix from an external monitoring institute**
- **Approval of quality-monitored mixing and surfacing machine, which certifies that the machine conforms to the set tolerances throughout the mixing period.**

## **Basic Conditions: ZTV BEA-StB 09/13**

**The contractor confirms the customer that the selected Asphalt Mixture will be corresponding to ZTV BEA-StB 09/13, Part DSK and will be fully appropriate to the site requirements.**

**What does it mean: ZTV-BEA-StB 09/13?**

**That are “Additional technical Contract Conditions and Guidelines for structural Maintenance and Stabilization of Asphalt Road Surfaces, issued in 2009 / Version 2013”.**

**These regulations are to be followed by both: the contractor as well as the Road Authority.**

**And it clearly defines the method of “Thin cold asphalt layers = Micro Surfacing (DSK)”**



## Contract Details

Herein the contractor confirms the customer that the selected Asphalt Mixture type XXX DSK5 – corresponding to ZTV BEA-StB 09/13, Part DSK – is fully appropriate to the site requirements.

Any further remarks below are part of the contract.

**Approval for proper Micro Surfacing Mix from external monitoring institute**

Approval-Nr.: 20140031

Dated: 31.03.2014

Asphalt Mixture type: XXX DSK5

Customer: Chief Administration of Karlsruhe County

<b>Purpose:</b>	regulating layer DSK 5 + wear coarse DSK 5
<b>Total quantity applied:</b>	25 kg/m <sup>2</sup> dry weight - as per specifications
<b>Construction Project:</b>	A5 FD Surface treatment from km 603+600 to km 591+200
<b>Date of Order:</b>	15.08.2014
<b>Contract nr.:</b>	45b1/3962 2 BAB
<b>Road Classification:</b>	SV = high density and heavy load traffic
<b>Contract basis:</b>	ZTV BEA-StB 09/13

## Details of Micro Surfacing Mix

### Composition of Micro Surfacing Mixture

Aggregate type:	Moraine
Max. aggregate size:	0/5 mm
Proportion > 2 mm:	55,6 M.-%
Proportion 0,063 - 2 mm:	38,0 M.-%
Proportion 0 - 0,063 mm:	<u>6,4 M.-%</u>
	100,0 M.-%

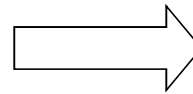
### Selected Mixture:

Binder content of dry weight: 6,5 M.-%

Proportion of bitumen emulsion: 10,7 (of DSK-Emulsion of 65,0 % bitumen)

Type of Bitumen emulsion: C65BP1-DSK as per German TL BE-StB 07, Table 6

# Calibration of Micro-Surfacing Machines



**Weighing and recording the aggregate output of the complete Hopper filling at constant belt speed**

<b>Kalibrierung der Misch- und Verlegemaschine für Dünne Schichten im Kalteinbau</b> <b>Messung der Fördermenge</b>	
Firma:	
Kalibriereinrichtung:	Stationäre Endwaage
Waagebrücke Typ:	19.03.2008
<b>Messprotokoll Nr.: 3479</b> Gestein: Moräne Graziat Schieberhöhe: 0 mm Förderbandgeschwindigkeit: Gesteinsmenge: 9708 kg	
<b>Messdiagramm:</b> Förderstärke (kg/min)	
<b>Messergebnis:</b> mittlere Fördermenge Gesteinskörnung trocken: 1219 kg/min Abweichung von der mittleren Fördermenge: 1.2 %	
<b>Beurteilung:</b> Die Gesteinsförderung zum Mischer der Misch- und Verlegemaschine liegt innerhalb der zulässigen Grenzlínen von ± 4 % gemäß TLG Asphalt-DSK-SIB 98/03. Die Messung wurde durchgeführt auf der stationären Waage- und Prüfeinrichtung der Fa. Protecta GmbH, Zentralbauhof, Teienkamp 41, 59494 Soest.	
Ort, Datum :	Soest, 19.05.08
Name:	



## Essential first steps before Micro Surfacing on Concrete

Proper cleaning of the surface in order to open and clean any cracks or hollow spaces by means of:



**Sweeper**



**High pressure water cleaner**

## Next essential step before Micro Surfacing on Concrete: Tack-Coating

As soon as the surface has been cleaned and possible excess water removed, the application process of Micro Surfacing starts.

To improve the adhesion between the new Micro Surfacing Layer and the existing concrete surface a Tack Coat of same Micro Surfacing emulsion is applied at about 220 g / m<sup>2</sup>. This enriches the bitumen content of the surface.

Due to the low viscosity of the emulsion – compared to the micro mix – the emulsion penetrates into any voids or cracks. This leads to a very intensive adhesion all over the surface!



**Tack-coating spraybar is installed behind the rear axle and directly in front of the micro spreader box!**

## Other Samples of Tack-Coating

This arrangement ensures that between pre-spraying and micro surfacing the Tack Coated surface remains untouched, no dirt or dust interferes the adhesion. The tack-coating width exactly corresponds to that of the spreader.



**Average spraying rate of 150 to 250 g/m<sup>2</sup>**

In the same run 12-13 kg/m<sup>2</sup> Micro-Surfacing type DSK 5 has been laid with the aid of a spreader box located directly behind the spray bar. As soon as the breaking process of the mix

## Micro Application followed by Compaction



Directly after tack-coating 12-13 kg/m<sup>2</sup> Micro Surfacing type „DSK 5“ (aggregate sieve size # 5: 5.6 mm) is applied by means of the spreader box directly behind the spraybar..



As soon as the breaking process of the mix starts the layer is additionally compacted by an 18 to rubber-tired roller. – Purpose: avoiding possible future pressure deformations in the surface.

## Second Run of Micro Application

About 30 minutes after having applied the first layer the second one is applied as follows:

**No Tack-coating**

**Micro Surfacing of 12-13 kg/m<sup>2</sup> Micro-Mix type**

**DSK 5 (aggregate sieve size # 5: 5.6 mm)**

**Compaction by an 18 ton rubber-tired roller.**





## Final Application Data

**While the first layer regulates the underlying concrete surface, the second one ensures an even running surface and improved texture.**

**Job figures:**

**Maintained Concrete Autobahn : right hand lane for heavy load traffic**

**Length of application: 12 Km**

**Width of lane: 3.5 m**

**Applied area: 40.000 m<sup>2</sup>**

**Application rate: 25 kg/m<sup>2</sup> in 2 runs**

**Duration of job: 4 days, restricted working hours – 10:00 am to 08:00 pm**



## The final result: Micro on Concrete Autobahn





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## The Advantages of Micro on Concrete Autobahn

**High installation performance due to fast application using modern Micro Surfacing machinery.  
Small, short traffic restrictions during the Micro Surfacing application.  
Traffic release on the freshly laid surface about 20 min. after laying**

**The high deformation resistance of the concrete substructure minimizes the compressibility  
or deformation of the Micro Surfacing layer.  
Reduction of road noise due to the relatively open structure of the Micro Surface.  
Improve of surface texture.**

**Temperature protection of the concrete surface thanks to the insulation by the Micro layer. Micro  
Surfacing seals the concrete surface, eliminates surface water penetrating into the concrete structure  
which reduces „Concrete Cancer“ – a chemical reaction within the concrete structure.**

**Finally: It increases the lifetime of the overall structure and saves money!**



## **Many thanks for your very kind attention!!**

**At the end of my presentation Messrs. *schaefer-technic GmbH* and myself – we like to sincerely express our thanks to**

**Messrs. Possehl Spezialbau GmbH Sprendlingen [www.possehl-spezialbau.de](http://www.possehl-spezialbau.de)  
especially their Dipl. Ing. Michael Dirschedl  
for their strong support when completing this presentation!**

**Author: Rainer Wiegmann**